upper 2 or 3 staminate. Glumes 10–13, membranous, 1-nerved, whitish, glabrous; the basal 3 or 4 empty, broadly lanceolate, 2.1–6.0 mm long, acute, apex with a short mucro ca. 0.5 mm long; upper glumes mostly 6.0–6.5 mm long, broadly acute. Stamens 3, anthers 3–4 mm long; style branches 2, ca. 1/10 the length of the undivided portion. Achenes biconvex, lenticular, grayish-brown, 2.5–2.7 mm long, 2.3–2.6 mm wide, 1.5–1.8 mm thick; achene body nearly orbicular in surface view with a rim around the entire circumference; surface of achene finely reticulate; style base elongate triangular, 2.0–2.4 mm long and 1.2–1.4 mm wide at its base, slightly narrower at its base than the apex of the achene, indistinctly reticulate, grayish-white. Hypogymous bristles 5 or 6, slightly shorter than achene and style base.

The following Panamanian collections have been examined (all MO):

PANAMÁ: Cerro Campana, *Croat 22794, 17160*. Along road into Santa Rita, *Kennedy 2745*. Road to Carti from Panamerican Highway near El Uano, *Kennedy, Dressler & Mahler 2413*. 3 mi. NE of Altos de Pacora, *Liesner 513*. COLÓN: Ca. 2–3 mi. up Río Guarche, *Kennedy & Foster 2148*. Santa Rita Ridge, 1 mi. from Boyd-Roosevelt Highway, *Croat 15320*. CANAL ZONE: Quebrada Lopez, *Allen 2129*.

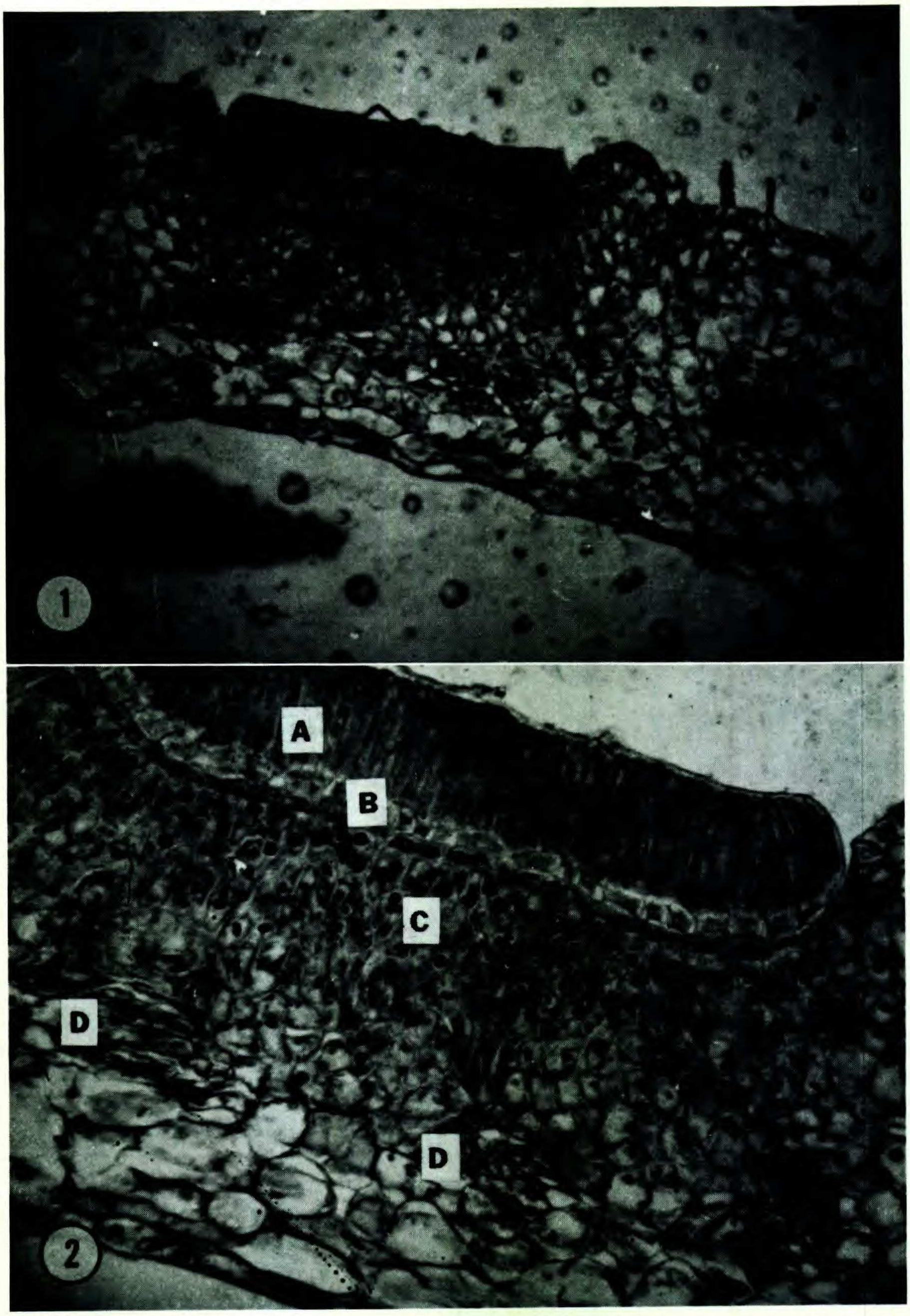
The rhizome system is striking in well-developed plants reminding one, on a smaller scale, of the pachymorph rhizomes of many bamboos.—*Gerrit Davidse, Missouri Botanical Garden.*

ANATOMIC CONSIDERATIONS OF THE CALYX OF *ADENOCALYMMA COMOSUM* (CHAM.) A.P. DC.

This investigation was motivated by the occurrence of patelliform glands on the calyx of the species of *Adenocalymma* Mart. *ex* Meisn. According to R. J. Siebert (Ann. Missouri Bot. Gard. 35: 123–136. 1948), the presence of glands in the Bignoniaceae is a characteristic of great value for the separation of taxa within the family. For a better understanding (and possibly for future taxonomic use), I decided to study the structure of these glands, and also the anatomy of the calyx. *Adenocalymma comosum* (Cham.) A.P. DC. was chosen for two reasons: it is the type species of the genus and material is easily obtained in the State of Guanabara, Brazil.

The material used for this study corresponds to herbarium sheet *D. Sucre 6600* in the Rio de Janeiro Botanical Garden Herbarium (RB), collected in the Serra do Mendanha, State of Guanabara.

Fresh material was used for microchemical tests. Structural observations were made on fresh material fixed in FPA. This material was submitted to the usual dehydration methods and paraffin impregnation. Blocking and cutting with a rotating microtome (thickness of 14 μ) followed the Jung method. The material was stained with safranin-fast green and mounted in Canada balsam. The presence of sugar was confirmed by Fehling's solution (D. A. Johansen, *Plant Microtechnique*, New York & London, 1940). Using a binocular Zeiss microscope, the most important details were recorded in microphotography.



FIGURES 1–2. The calyx of *Adenocalymma comosum*.—1. Transverse section showing a patelliform gland. 57 ×.—2. Details of the calyx: A. Secretory cells of the gland. B. Quadrangular cells which unite the gland to the calyx. C. Parenchymatous cells of the mesophyll arranged similarly to palisade tissue, with the large nuclei apparent. D. Vascular bundles consisting essentially of sieve-tube members. 110 ×.

In transverse section, the calyx presents an abaxial epidermis consisting of rectangular or approximately isodiametric cells, with the greater diameter in the periclinal direction. The protective cuticle is thin. A dense covering of simple, uni- or multicellular hairs was observed, these either uniseriate, branched, or articulated. The presence of glandular hairs and stomata as well as patelliform glands at the base of the narrow lobes was also recorded. The adaxial epidermis consists of rectangular cells with a greater diameter in the periclinal direction, covered by a thin cuticle. Capitate glandular hairs were also observed. These trichomes, as well as the stomata, will be described separately when considering the epidermis. The region situated between the epidermis (mesophyll, see K. Esau, *Anatomia Vegetal*, Barcelona, 1959) consists of various layers of parenchyma cells. The thicker sections correspond to the region of the most developed vein or to the edges of the patelliform glands. These parenchymatous elements have irregular forms, and their walls are somewhat thickened with few intercellular spaces. Submerged in this tissue are the vascular bundles, consisting of spiraled xylem vessels and phloem elements (sieve-tube members and companion cells) wrapped by a parenchymatous sheath.

In frontal view, the abaxial epidermis of the calyx of *Adenocalymma comosum* (Cham.) A.P. DC. presents 4–6-sided, polygonal shaped cells with straight walls. The stomata are of the paracytic type. The adaxial epidermis in frontal view is made up of 5–6-sided cells, also approximately polygonal in shape, which are larger than those of the abaxial epidermis.

The simple hairs observed on the adaxial surface exhibit verrucose thickenings on the smooth cuticle. The unicellular hairs are usually elongate, sometimes with a curved tip (uncinate hair). They present verrucose thickenings on the cuticle of the basal cell. The bicellular hairs have, as a rule, verrucose thickenings on the cuticle of both the basal and apical cells. The pluricellular hairs have from 3 to 10 cells. All except the basal cell are provided with verrucose thickenings on the cuticle. They may be uniserate, branched, or articulated. The form and arrangement of the cells also varies.

The glandular hairs that occur on this epidermis are capitate. In transverse section, they present a bicellular base located in the plane of the epidermis and connected to the bilcellular "head" by a connecting cell (J. C. T. Uphof, Plant hairs. *In* K. Linsbauer, "Encyclopaedia of Plant Anatomy, Vol. 4, Histology." Berlin. 1962). In frontal view, a total of 12 cells can be seen. The capitate glandular hairs which occur on the abaxial epidermis are made up of a unicellular base, a unicellular "head" and one or two connecting cells. The patelliform glands are located in depressions on the epidermis. In frontal view, they are discoid in shape with a reticulate-thickened cuticle that becomes even more evident at the edge of the gland. In longitudinal section, they are made up of elongate cells, arranged like palisade tissue (secretory cells, E. Haberlandt, *Physiological Plant Anatomy*, London, 1928), some of them transversally divided. They have dense cell contents, large nuclei, and conspicuous nucleoli. They are connected to the calyx by quadrangular cells with conspicuous intercellular spaces. The protective cuticle is broken in some places, as a result of the expelling of excreted substances (see Haberlandt, *op. cit.*, and Esau, *op. cit.*).

In the region of gland implantation the epidermal cells of the calyx and also those of the mesophyll exhibit some modifications. These cells are much smaller than the others, with thin walls, dense cellular contents, and a well defined nucleus. The parenchymatous elements of the thin walled mesophyll are arranged in 3 or 4 layers, like palisade cells. Here, the vascular bundles consist essentially of sieve-tube elements that separate concentrated sugar solutions. Upon submitting the sections to Fehling's solution, the formation of abundant cupric oxide precipitate was observed, indicating the presence of sugars, not only in the cells of the glands, but also in the palisade cells of the mesophyll.

Due to their morphology and reaction of Fehling's solution (indicative of sugar presence), I conclude that the patelliform glands of the calyx of *Adenocalymma comosum* (Cham.) A.P. DC. carry out the function of nectaries.

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GIBSONIOTHAMNUS (SCROPHULARIACEAE) IN PANAMA

The species of the recently described genus *Gibsoniothamnus* L. Wms. (Fieldiana, Bot. 32: 211. 1970) are rarely collected and apparently highly endemic. Besides the three Panamanian species described here and *G. epiphyticus* (Standl.) L. Wms. of Costa Rica, the genus contains three species—*G. cornutus* (Donn. Sm.) A. Gentry, *G. mimicus* (Standl. & Steyerm.) L. Wms., and *G. moldenkeanus* (Standl.) L. Wms.—of Guatemala and adjacent Mexico.

The familial placement of this genus and its ally *Schlegelia* remains a matter of some conjecture as noted by Monachino (Phytologia 3: 102–105. 1949), Williams (Fieldiana, Bot. 32: 211. 1970) and Gentry (Fieldiana, Bot. 34: 55. 1971), among others. The four previously known species of *Gibsoniothamnus* were all described under *Clerodendron* in the Verbenaceae. One of these same species had also been described under *Schlegelia* of the Bignoniaceae. *Schlegelia* itself was described twice, first in Gesneriaceae (later transferred to Bignoniaceae) and again in Scrophulariaceae as *Dermatocalyx*; *Schlegelia* and *Dermatocalyx* were treated separately in such works as Bentham & Hooker's *Genera Plantarum* (1876), Baillon's *Histoire des Plantes* (1888, 1891), Engler and Prantl's *Natürlichen Pflanzenfamilien* (1894), and Standley's *Flora of Costa Rica* (Publ. Field Mus. Nat. Hist., Bot. Ser. 18: 1105, 1128. 1938).

Williams described *Gibsoniothamnus* in the Scrophulariaceae, pointing out that it has even more in common with that family than does *Schlegelia* and interpreted the new genus as evidence linking *Schlegelia* with Scrophulariaceae